CLAIMS

What is claimed is:

1.   1.   A method, comprising

2.   performing a comparison of a first version of a network resource and

3. a second version of the network resource, the comparison performed by a

4. gateway connected to a network, the first version stored in the gateway, the

5. second version sent to the gateway from a server connected to the network; and

6.   when the second version is different from the first version,

7. calculating difference data between the second version and the first version,

8. sending the difference data to a client coupled with the gateway, and storing the

9. second version in the gateway as the first version.

1.   2.   The method of claim 1 wherein the client stores a copy of the first version of

2. the network resource.

1.   3.   The method of claim 2, wherein when the client receives the difference data,

2. the difference data is merged with the copy of the first version of the network

3. resource to generate a copy of the second version of the network resource.

1.   4.   The method of claim 1, wherein the client is coupled with the gateway through

2. a narrow bandwidth connection.

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1   5.   A computer readable medium having stored thereon sequences of instructions

2   which are executable by a system, and which, when executed by the system,

3   cause the system to:

4   perform a comparison of a first version of a network resource and a

5   second version of the network resource, the comparison performed by a

6   gateway connected to a network, the first version stored in the gateway, the

7   second version sent to the gateway from a server connected to the network; and

8   when the second version is different from the first version, calculate

9   difference data between the second version and the first version, send the

10   difference data to a client coupled with the gateway, and store the second version

11   in the gateway as the first version.

1   6.   The computer readable medium of claim 5 wherein the client stores a copy of

2   the first version of the network resource.

1   7.   The computer readable medium of claim 6, wherein when the client receives

2   the difference data, the difference data is merged with the copy of the first version

3   of the network resource to generate a copy of the second version of the network

4   resource.

1   8.   The computer readable medium of claim 5, wherein the client is coupled with

2   the gateway through a narrow bandwidth connection.

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1 9. A method, comprising:

2   receiving a request for a network resource from a client using a

3 narrow bandwidth connection, the request including an identifier for the network

4 resource;

5   getting a new copy of the network resource from a content server

6 using the identifier, the content server connected to a network;

7   determining if a current copy of the network resource exists using the

8 identifier;

9   when the current copy of the network resource exists, calculating

10 difference data between the current copy of the network resource and the new

11 copy of the network resource, and sending the difference data to the client;

12   when the current copy of the network resource does not exist,

13 sending the new copy of the network resource to the client; and

14   storing the new copy of the network resource as the current copy of

15 the network resource.

1 10. The method of claim 9, when the current copy of the network resource exists,

2 the current copy of the network resource is a mirror of a copy of the network

3 resource stored in the client.

1 11. The method of claim 10, wherein the difference data is merged with the copy

2 of the network resource stored in the client to generate the new copy of the net

3 work resource.

1 12. The method of claim 11, wherein the new copy of the network resource is

2 stored in the client.

1 13. The method of claim 9, when the current copy of the network resource does

2 not exist, the new copy of the network resource is stored in the client.

1 14. The method of claim 9, wherein the difference data is calculated using

2 Lempel-Ziff (LZW) compression algorithm.

1 15. A computer readable medium having stored thereon sequences of instructions

2 which are executable by a system, and which, when executed by the system,

3 cause the system to:

4   receive a request for a network resource from a client using a narrow

5 bandwidth connection, the request including an identifier for the network resource;

6   get a new copy of the network resource from a content server using

7 the identifier, the content server connected to a network;

8   determine if a current copy of the network resource exists using the

9 identifier;

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10   when the current copy of the network resource exists, calculate

11 difference data between the current copy of the network resource and the new

12 copy of the network resource, and send the difference data to the client;

13   when the current copy of the network resource does not exist, send

14 the new copy of the network resource to the client; and

15   store the new copy of the network resource as the current copy of

16 the network resource.

1 16. The computer readable medium of claim 15, when the current copy of the

2 network resource exists, the current copy of the network resource is a mirror of a

3 copy of the network resource stored in the client.

1 17. The computer readable medium of claim 16, wherein the difference data is

2 merged with the copy of the network resource stored in the client to generate the

3 new copy of the net work resource.

1 18. The computer readable medium of claim 17, wherein the new copy of the

2 network resource is stored in the client.

1 19. The computer readable medium of claim 15, when the current copy of the

2 network resource does not exist, the new copy of the network resource is stored in

3 the client.

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1   20.   The computer readable medium of claim 15, wherein the difference data is

2   calculated using Lempel-Ziff (LZW) compression algorithm.

1   21. A method, comprising:

2   sending a request for a new copy of a network resource to a gateway

3   using a narrow bandwidth connection;

4   receiving data from the gateway in response to the request for the

5   new copy of the network resource;

6   when the data is difference data, merging the data with a stored

7   current copy of the network resource to form the new copy of the network

8   resource, and storing the new copy of the network resource; and

9   when the data is not the difference data, storing the data as the new

10 copy of the network resource.

1   22. The method of claim 21, wherein receiving data from the gateway comprises

2   receiving a difference data indicator, wherein when the difference data indicator is

3   set, the data is the difference data, and when the difference data indicator is reset,

4   the data is not the difference data.

1   23. The method of claim 21, wherein the difference data is calculated by the

2   gateway using a mirror copy of the current copy of the network resource and a

3   new copy of the network resource provided by a content server.

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1   24. The method of claim 23, wherein the difference data is calculated using

2   Lempel-Ziff (LZW) compression algorithm.

1   25.   A gateway computer system, comprising:

2   a global cache for storing mirror copies of network resources stored at a

3   client computer coupled with the gateway computer through a narrow bandwidth

4   connection, the network resources having previously transmitted to and stored in

5   the client computer;

6   a comparison means to determine if a copy of a network resource sent by a

7   content server is equivalent to a copy of a network resource stored in the global

8   cache, the copy of the network resource sent by the content server in response to

9   a request from the client computer for an updated copy of the network resource;

10   and

11   a difference data calculation means to calculate difference data

12   representing difference between the copy of the network resource sent by the

13   content server and the copy of the network resource stored in the global cache

14   when these copies are different.

1   26.   The system of claim 25, wherein the gateway computer sends the

2   difference data to the client computer.

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1   27.   The system of claim 26, wherein the difference data is merged with a copy

2   of the network resource stored in the client computer to create an updated copy of

3   the network resource, the updated copy of the network resource being equivalent

4   to the copy of the network resource sent by the content server to the gateway

5   computer in response to the client computer requesting for the updated copy of

6   the network resource.

1   28.   A gateway computer system, comprising:

2   a global cache for storing mirror copies of network resources stored at a

3   client computer coupled with the gateway computer through a narrow bandwidth

4   connection, the network resources having previously transmitted to and stored in

5   the client computer;

6   logic to determine if a copy of a network resource sent by a content server

7   is equivalent to a copy of a network resource stored in the global cache, the copy

8   of the network resource sent by the content server in response to a request from

9   the client computer for an updated copy of the network resource; and

10   logic to calculate difference data representing difference between the copy

11   of the network resource sent by the content server and the copy of the network

12   resource stored in the global cache when these copies are different.

1   29.   The system of claim 28, wherein the gateway computer sends the

2   difference data to the client computer.

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1 30. The system of claim 28, wherein the difference data is merged with a copy

2 of the network resource stored in the client computer to create an updated copy of

3 the network resource, the updated copy of the network resource being equivalent

4 to the copy of the network resource sent by the content server to the gateway

5 computer in response to the client computer requesting for the updated copy of

6 the network resource.

1 31. A client computer system, comprising:

2   a local cache for storing copies of network resources previously transmitted

3 from a gateway computer, the gateway computer coupled with the client computer

4 through a narrow bandwidth connection, the gateway computer connected to a

5 network;

6   means for determining if data received from the gateway computer is

7 difference data, the difference data representing a difference between a copy of a

8 network resource sent from a content server to the gateway computer and another

9 copy of the same network resource stored in the local cache, the content server

10 connected to the network; and

11   means for merging the difference data with the copy of the network

12 resource stored in the local cache to create a merged data, the merged data being

13 equivalent to the copy of the network resource sent from the content server.

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1   32.   The system of claim 31, wherein the gateway computer calculates the

2   difference data.

1   33.   The system of claim 32, wherein the gateway computer calculates the

2   difference data using Lempel-Ziff compression algorithm.

1   34.   A client computer system, comprising:

2   a local cache for storing copies of network resources previously transmitted

3   from a gateway computer, the gateway computer coupled with the client computer

4   through a narrow bandwidth connection, the gateway computer connected to a

5   network;

6   logic to determine if data received from the gateway computer is difference

7   data, the difference data representing a difference between a copy of a network

8   resource sent from a content server to the gateway computer and another copy of

9   the same network resource stored in the local cache, the content server

10   connected to the network; and

11   logic to merge the difference data with the copy of the network resource

12   stored in the local cache to create a merged data, the merged data being

13   equivalent to the copy of the network resource sent from the content server.

1   35.   The system of claim 34, wherein the gateway computer calculates the

2   difference data.

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1   36.   The system of claim 35, wherein the gateway computer calculates the

2   difference data using Lempel-Ziff compression algorithm.

1   37.   A method, comprising

2   performing a comparison of a first data and a second data; and

3   when the second data is different from the first data,

4   calculating difference data between the second data and the

5   first data, and sending the difference data to a receiving computer

6   using a narrow bandwidth connection.

1   38. The method of claim 37, wherein the receiving computer stores a copy of

2   the first data.

1   39. The method of claim 38, wherein when the receiving computer receives

2   the difference data, the difference data is merged with the copy of the

3   first data to generate a copy of the second data.

1   40.   The method of claim 37, wherein calculating the difference data comprises

2   forming a program module to generate the difference data.

1   41.   The method of claim 40, wherein the program module updates the first data

2   to make the first data similar to the second data.

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1   42.   The method of claim 37, wherein the first data and the second data are

2   image data.

1   43.   The method of claim 37, wherein the first data and the second data are

2   audio data.

1   44.   A method, comprising

2   receiving a first data from a client through a narrow bandwidth connection;

3   and

4   storing a copy of the first data when there is an indication that an

5   incremental change for the first data is to be expected from the client.

1   45.   The method of claim 44, further comprising:

2   receiving the incremental change for the first data; and

3   generating a second data using the stored copy of the first data and the

4   incremental change for the first data.

1   46.   The method of claim 45, further comprising storing the second data as the

2   first data.

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1   47.   The method of claim 45, wherein receiving the incremental change for the

2   first data comprises receiving a program module formed to generate the

3   incremental change.

1   48.   The method of claim 44, wherein the first data and the second data are

2   audio data.

1   49.   The method of claim 44, wherein the first data and the second data are

2   image data.

1   50. A computer readable medium having stored thereon sequences of instructions

2   which are executable by a system, and which, when executed by the system,

3   cause the system to:

4   receive a first data from a client through a narrow bandwidth connection;

5   and

6   store a copy of the first data when there is an indication that an incremental

7   change for the first data is to be expected from the client.

1   51.   The computer readable medium of claim 50, further comprising instructions

2   to:

3   receive the incremental change for the first data; and

4   generate a second data using the stored copy of the first data and the

5   incremental change for the first data.

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1   52.   The computer readable medium of claim 51, further comprising instructions

2   to store the second data as the first data.

1   53.   The computer readable medium of claim 51, wherein the incremental

2   change for the first data is generated by a program module sent by the client.

1   54.   The computer readable medium of claim 50, wherein the first data and the

2   second data are audio data.

1   55.   The computer readable medium of claim 50, wherein the first data and the

2   second data are image data.

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